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A MEASURE OF PROGRESS IN THE MECHANICAL OPERATIONS OF ARITHMETIC

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It seems difficult to secure a measure which will allow a careful record to be kept of the progress of different pupils in the mechanical operations of arithmetic. A simple means is here suggested. The device is valuable for other purposes also, since it stimulates pupils to learn number combinations and helps to bring them up to a definite standard of efficiency.

All that is needed in the way of materials is a cord about four feet in length, a weight sufficiently heavy to serve as pendulum bob, and a support that will allow the pendulum to swing clear of the wall. Interest in the use of the device is easily aroused. The teacher suspends the pendulum, having its initial length such that it will vibrate slowly. By way of concrete example, let us consider its use in a fourth grade where the multiplication tables are still troublesome, and the simple number combinations are still unmastered. The pendulum is set in motion, at first at its maximum length, therefore at its maximum time periods. If the drill desired is in addition, let the teacher announce a *constant*, as six. After the class has the constant well in mind, some starting-point is announced, as nine. In concert the class gives the results of successive additions of six, starting with the base nine: "Nine, fifteen, twenty-one, twenty-seven," etc. It will be surprising how many drop out as the numbers grow larger. Here is a sifting process. If this were the only value, it might be worth while; but the greatest value of the device lies in the accurate measure of attainment at any period of arithmetical work. The pupils who drop out early in the concert recitation are urged to suspend such pendulums at their homes and drill themselves, shortening the pendulum as fast as possible. The *length* of the pendulum is recorded and furnishes a measure both accurate and universal in application.

It may appear to some that this is a mere drill device. It does furnish suggestions for different drills to the teacher of original mind, but the greatest value in its use is the accurate measure afforded of both class and individual advancement. If the drill be in subtraction, some such base as thirty-five is announced, with four as the constant to be subtracted. The recitation proceeds: "Thirty-five, thirty-one, twenty-seven, twenty-three," etc.

In multiplication this drill or test can be used in various ways. Only one will be given here. Let a constant, as eight, be announced. The pendulum is set vibrating slowly. As the bob reaches its left-hand limit the variables are announced by the teacher, the class giving the products as the pendulum approaches its right-hand limit.

The teacher will see many ways to vary the use of this simple device, both as a means for drill and as an accurate measure of results. The device has proved also to be a welcome aid in this part of arithmetic work which is so often a drag to the teacher and the grade.